Armed Forces College of Medicine

AFCM

Muscle stretch

Classification of human reflexes

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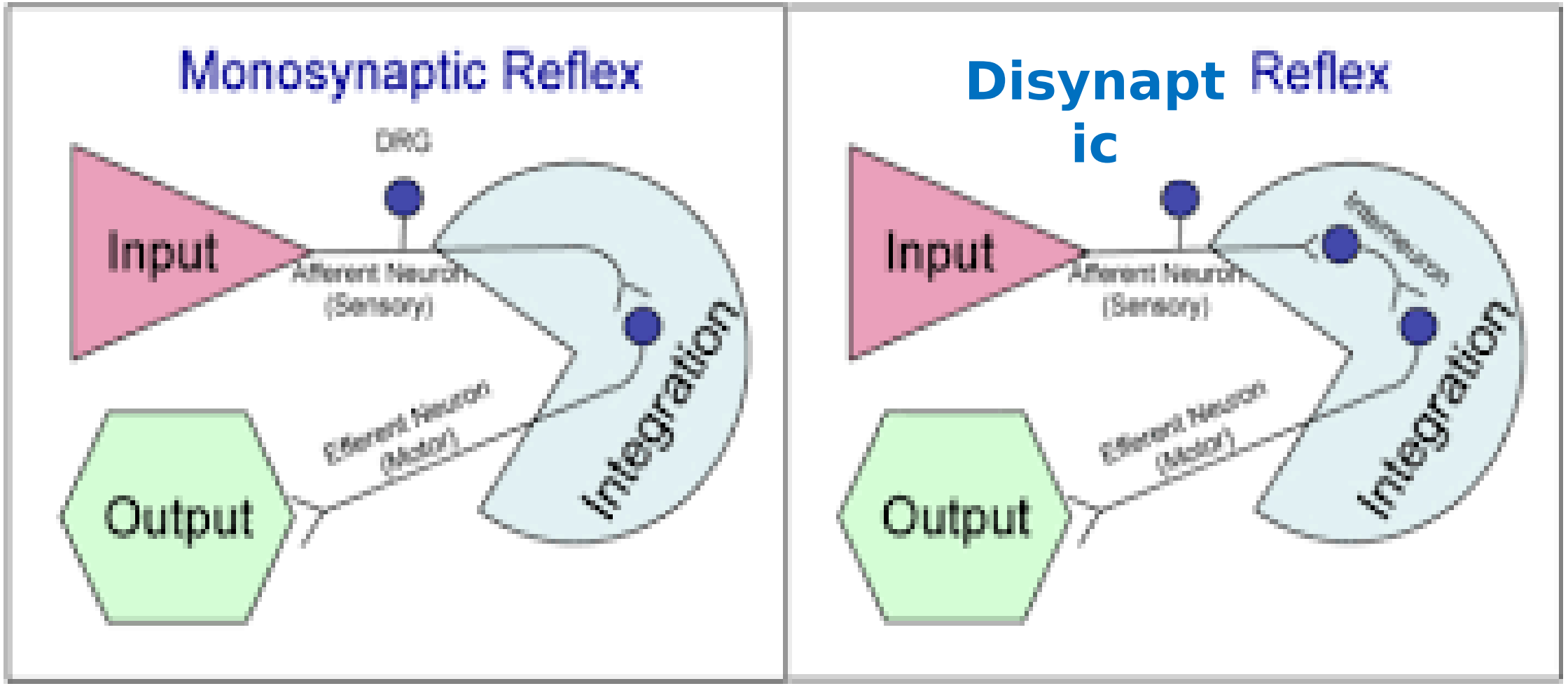
Lecturer of Physiology

INTENDED LEARNING OBJECTIVES (ILO)

By the end of this lecture the student will be able to:

- **Classify human reflexes**
- **Explain each one**
- **Explain the character and clinical significance of each**
- **Classify spinal reflexes**
- **Explain each**

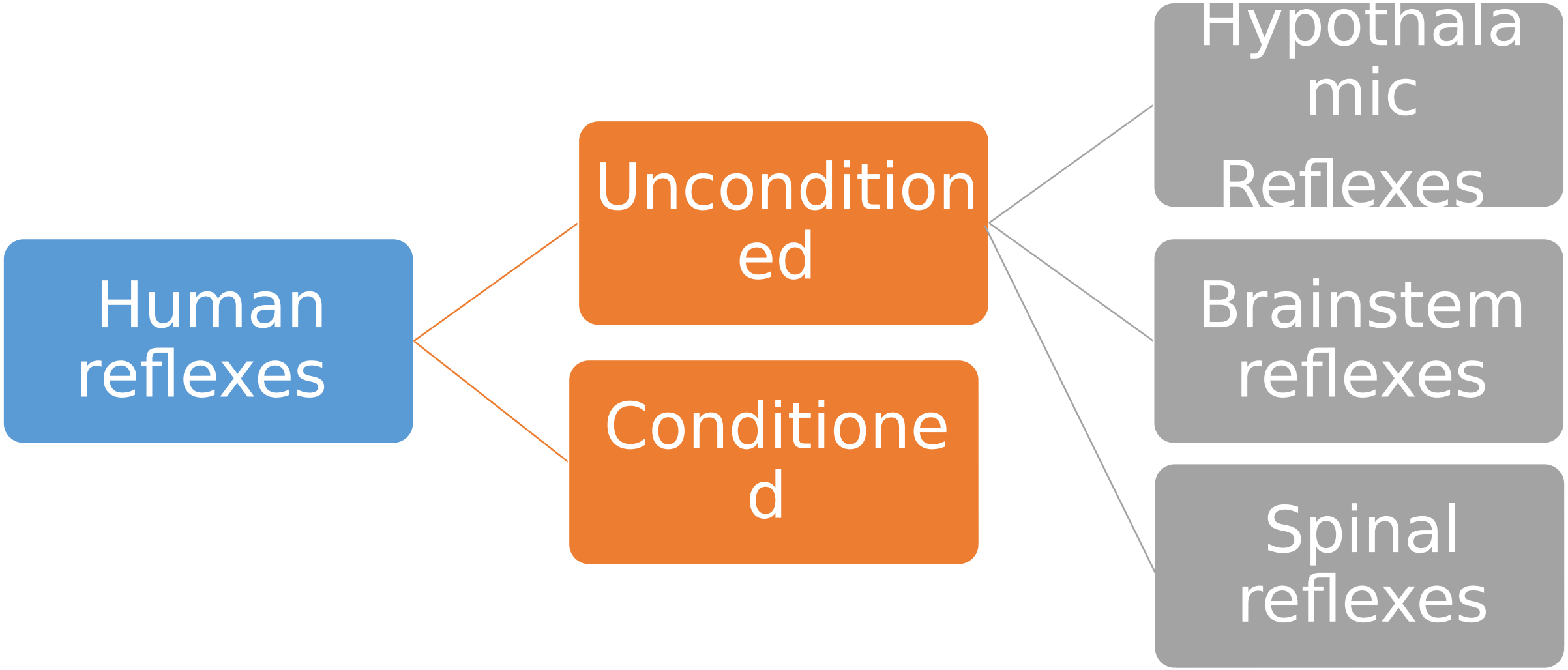
Classification of Human Reflexes



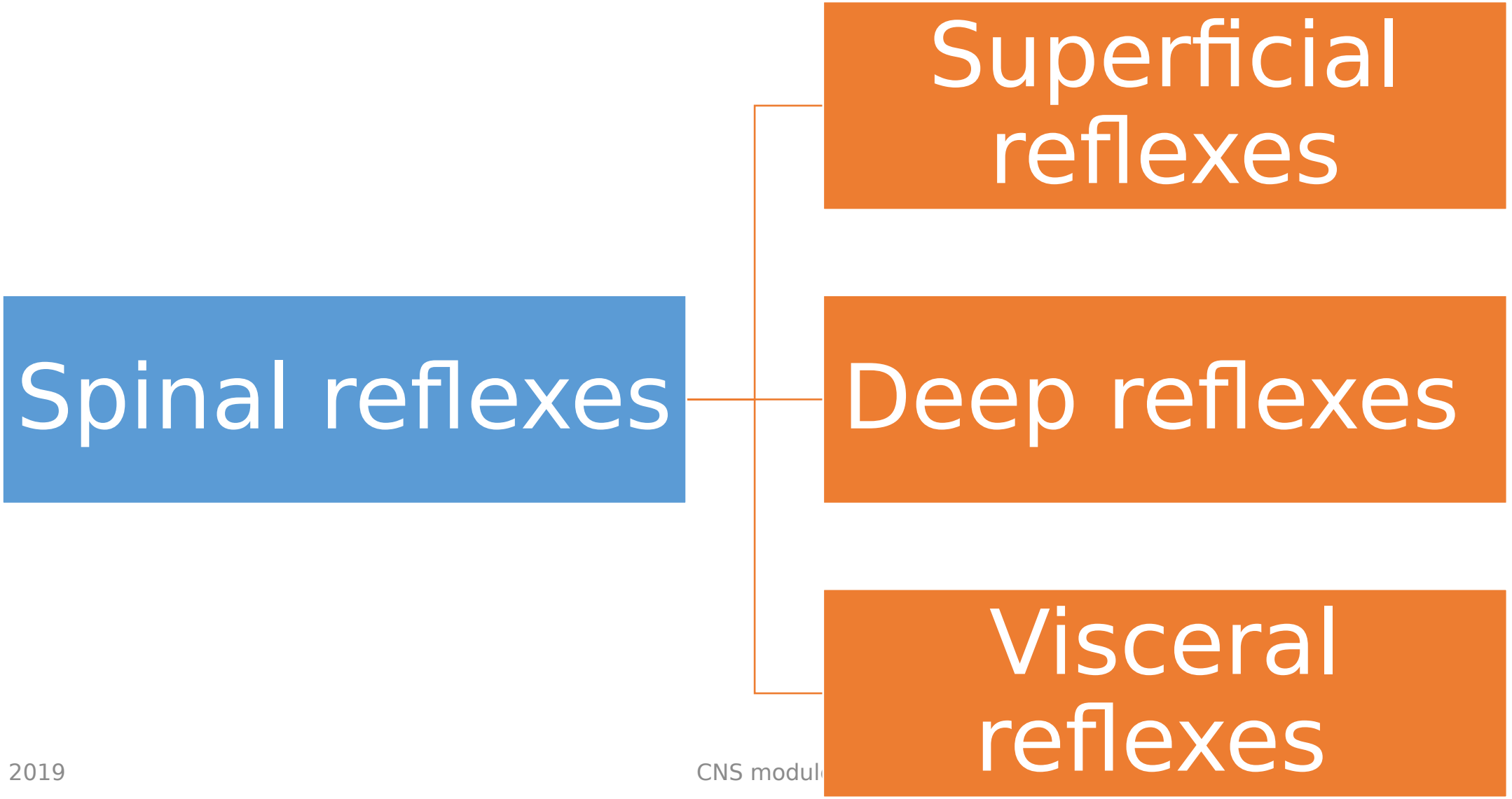
Classification of Human Reflexes

Conditioned Reflexes	Unconditioned Reflexes
Acquired after birth, needs education & training	Inborn reflexes (since birth).
Integrated in the **cerebral cortex**	Integrated below the level of the cortex 1- Hypothalamus 2-Brain Stem 3- Spinal cord

Classification of Human Reflexes

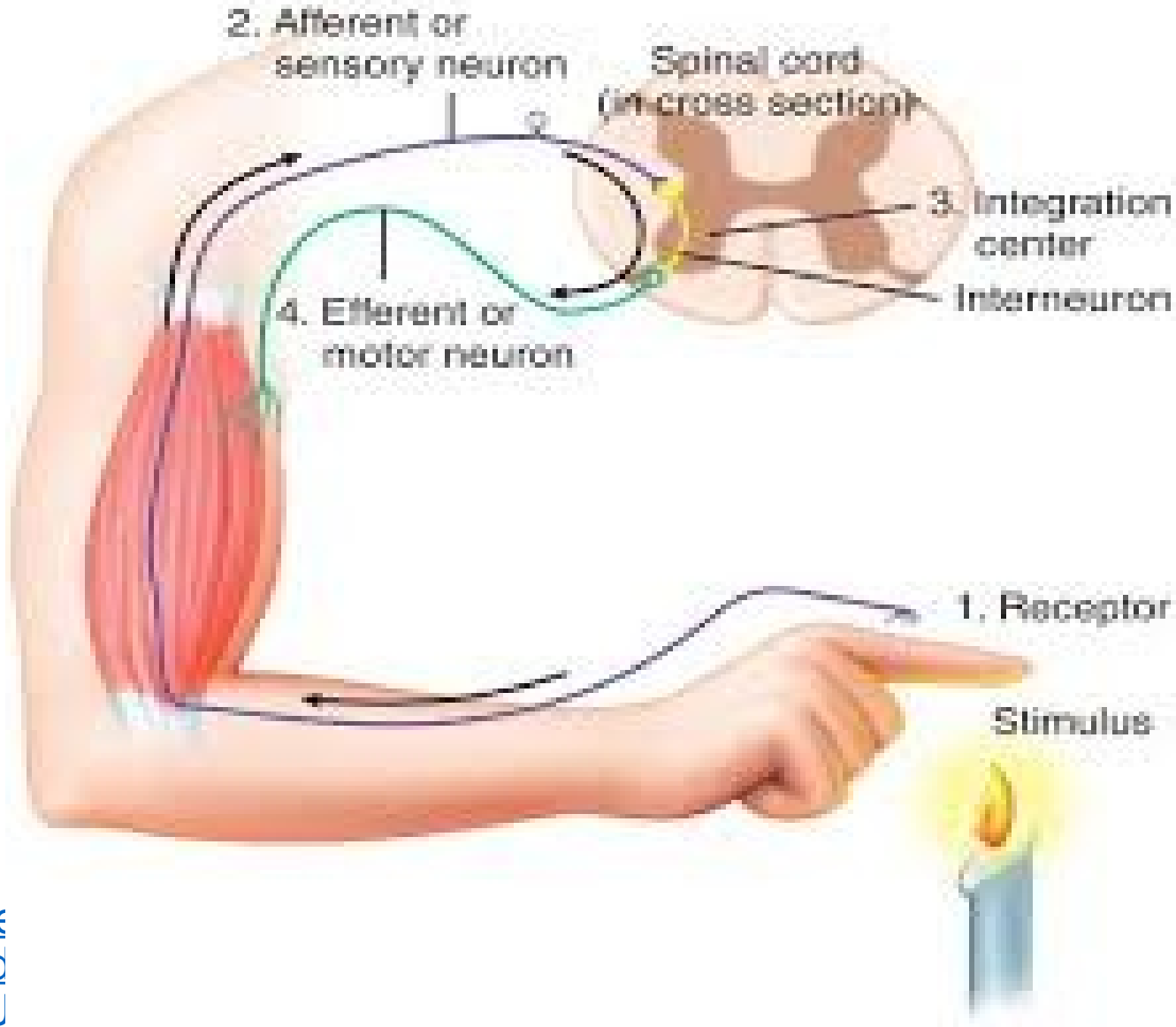


Classification of Spinal Reflexes



Superficial Reflexes : Withdrawal Reflex.

- ✓ **This is a protective and prepotent reflex (inhibits other reflexes).**
- ✓ **<u>Stimulus:</u> noxious stimulus**
- ✓ **<u>Afferent nerve</u>: Aδ and C nerve fibers (pain afferents).**
- ✓ **Efferent: alpha motor**



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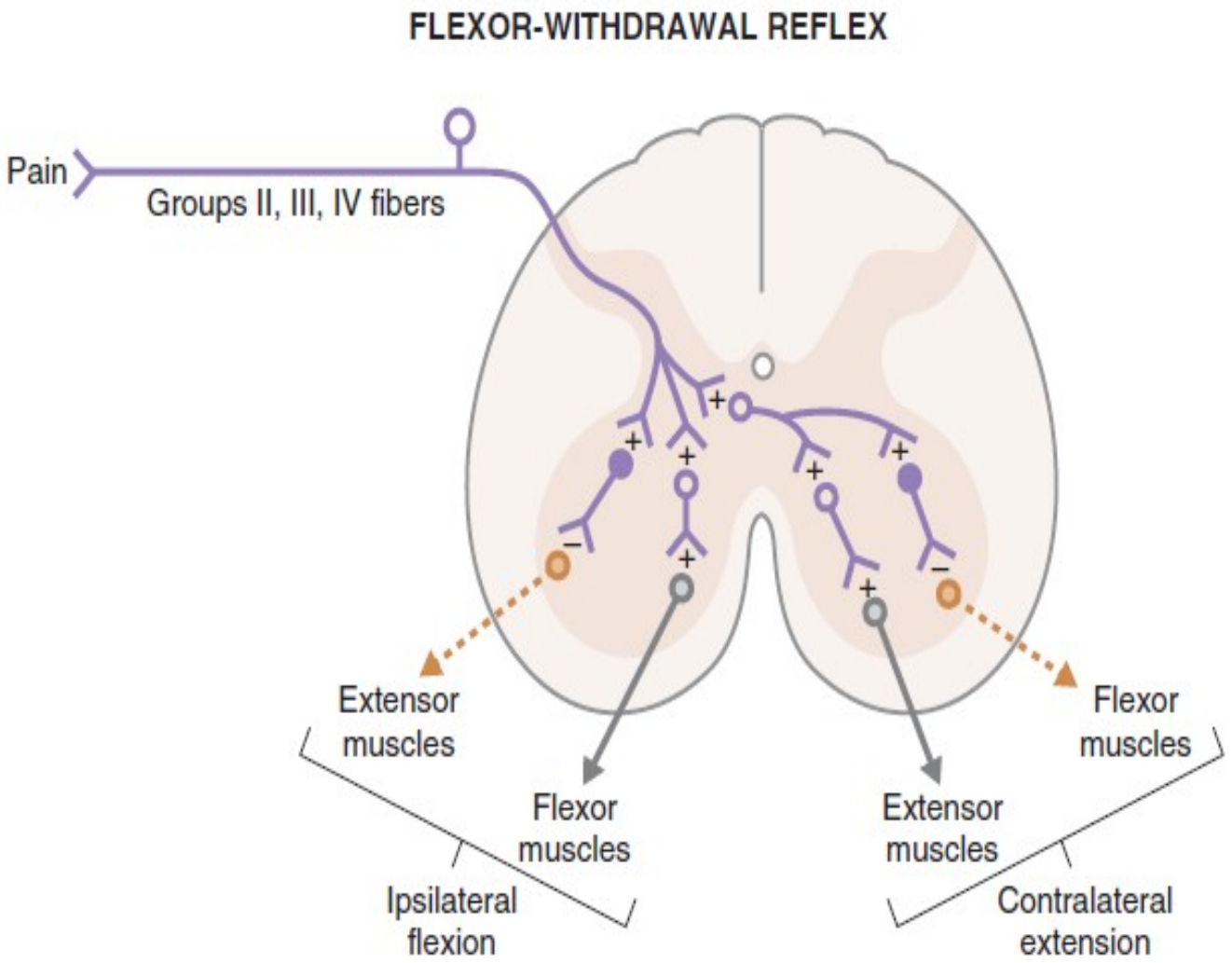
Superficial Reflexes : Withdrawal Refle

✓ **Response:**

1-Reflex contraction of flexors to withdraw the limb away from the stimulus.

2-Parts of body other than limbs can elicit withdrawal reflex involving complex pattern other than contraction of flexors.

3-Up to moving the whole body from the cause of pain



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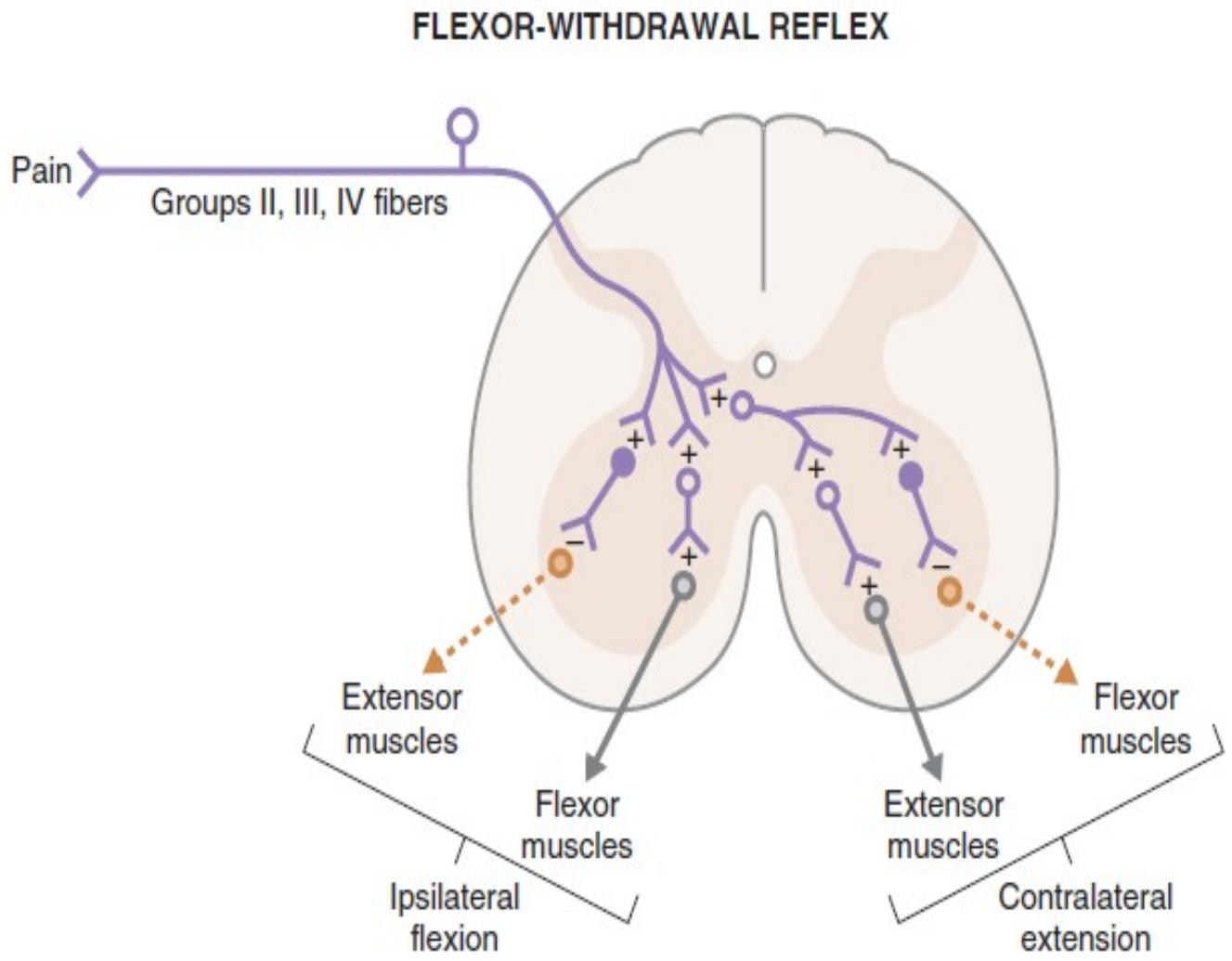
Superficial Reflexes : Withdrawal Refle

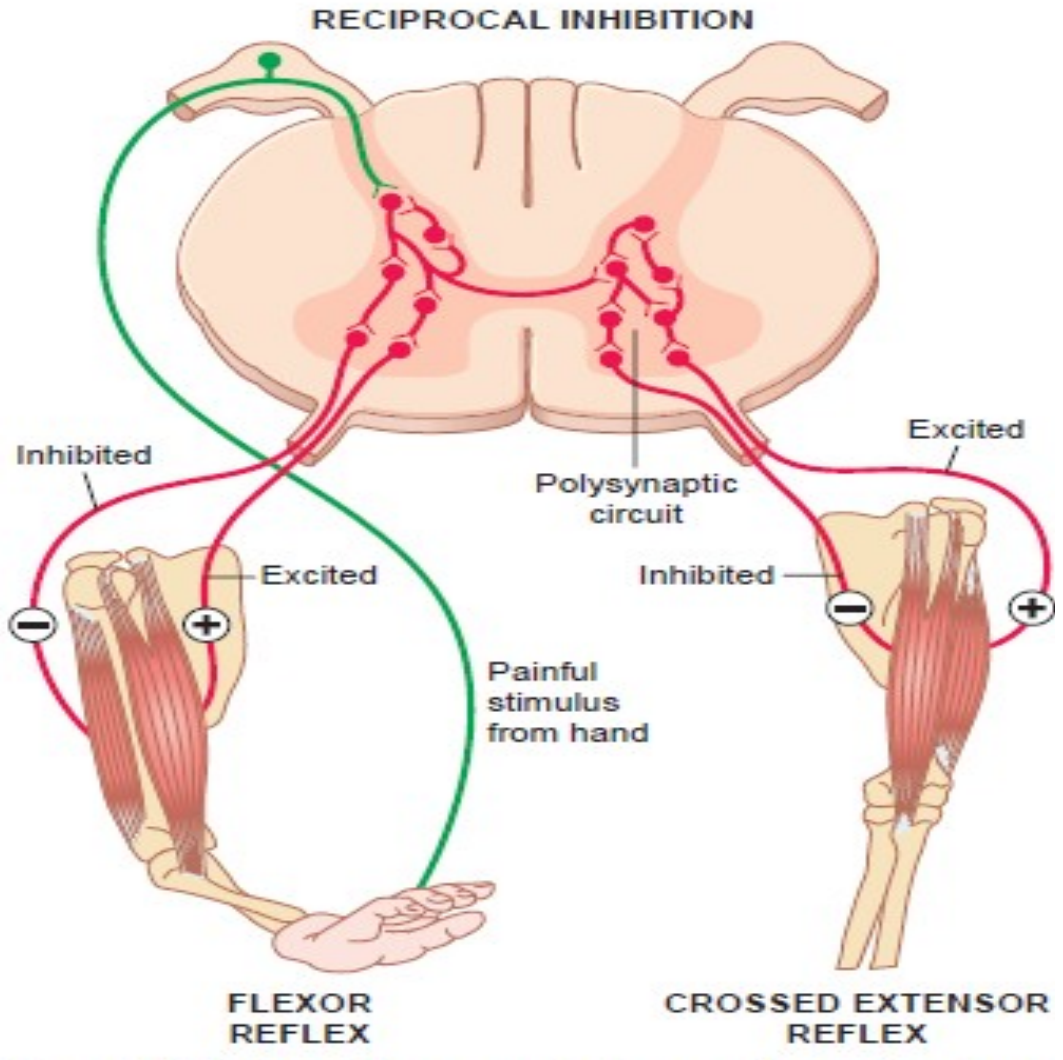
- **Centre: according to stimulated muscle**
- **Function :**

  - It is a polysynaptic reflex that is characterized by irradiation, reverberating circuits, reciprocal inhibition and after discharge.
  - Muscle Contraction removing the pained or irritated part of



Superficial reflexes: Crossed extensor Reflex

- ✓ **Stimulus : Strong noxious stimulus of one limb**
- ✓ **Afferent nerve: Aδ and C**
- ✓ **Efferent: alpha motor neuron to extensor muscles of opposite side**
- ✓ **Response : reflex extension of opposite limb (as a result of withdrawal reflex).**
- ✓ **Center: motor neuron pool of affected muscle**



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Superficial reflexes: Positive supporting Reflex (reaction)

- ✓ **Stimulus: Deep pressure on the sole foot (by the body weight during standing)**
- ✓ **Response: Contraction of both the flexors and the extensors to support the body in an upright position against gravity.**

Centre: motor neuron pool of

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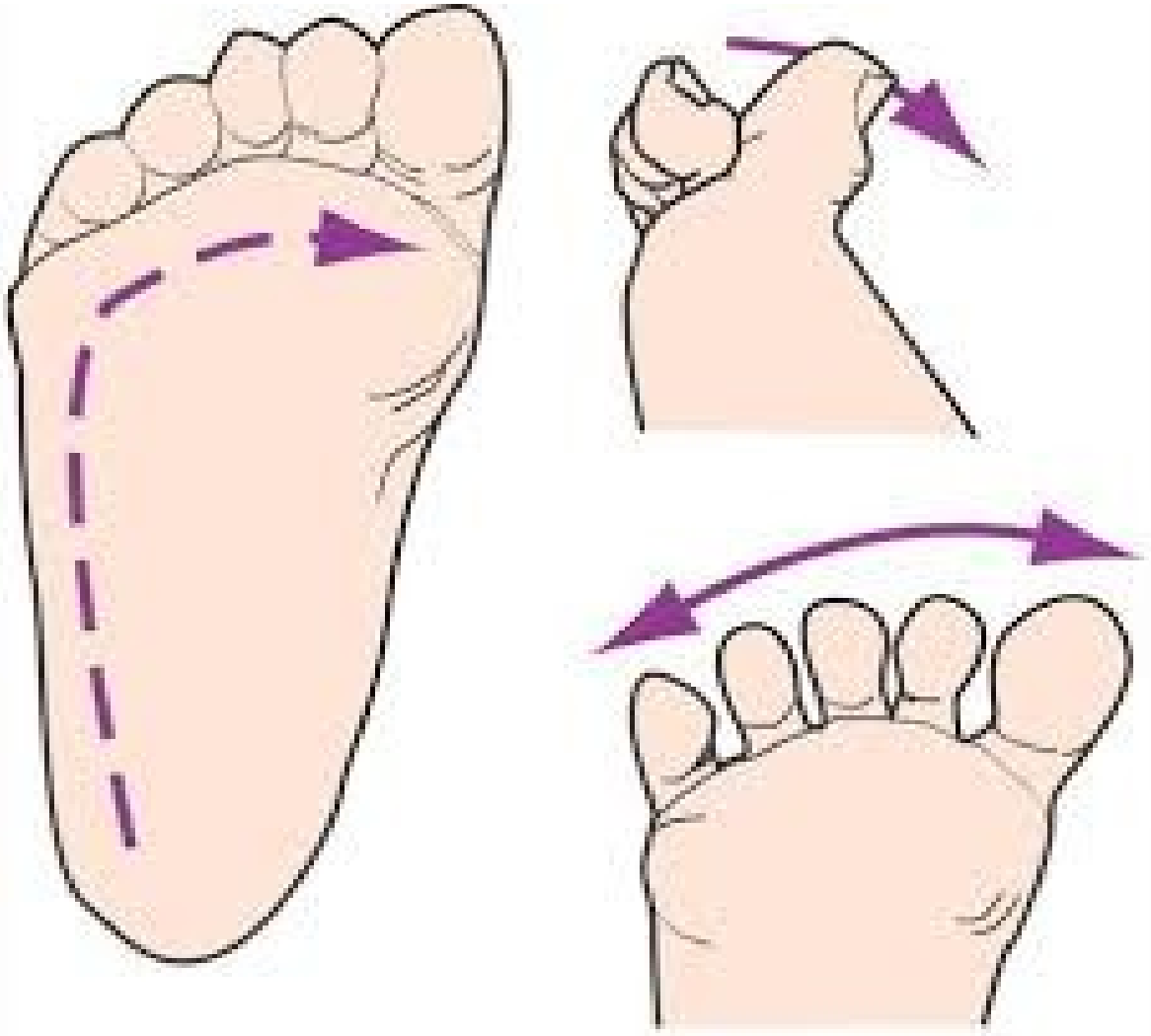
9&h=261&q=positive%20supporting%20reaction

Superficial reflexes: Planter Reflex

- ✓ **Stimulus: scratching the lateral side of the sole from below upwards and then medially leads to plantar flexion of toes.**
- ✓ **Response: planter flexion of the toes.**
- ✓ **Abnormal response : dorsiflexion of big toe and fanning of other toes. This is named positive Babinski sign.**



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Superficial reflexes: Planter Reflex

Some physiological conditions

(pseudo positive Babinski

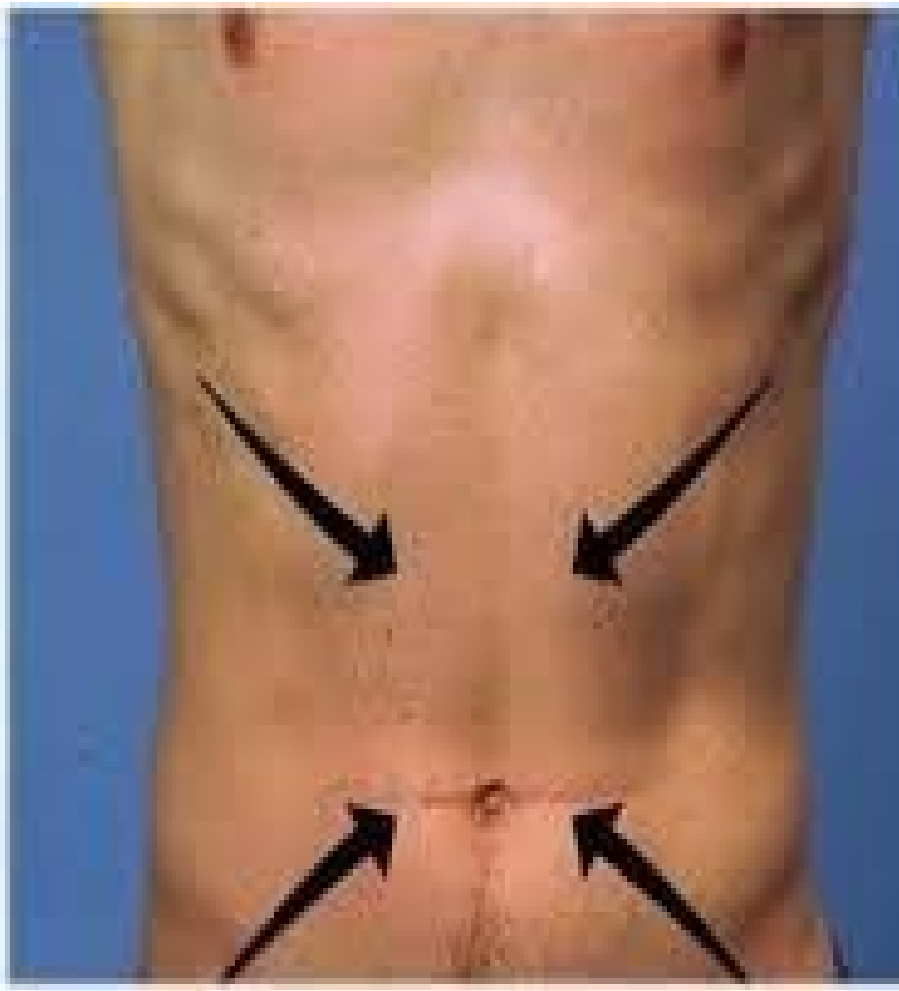
- Newly born infants (below 1 year) due to lack of myelination of the tracts
- Deep sleep
- General anesthesia

Pathological conditions

- ✓ Coma
- ✓ Upper motor neuron lesion: **Partial positive Babinskis sign :** dorsiflexion of big toe (area 4 lesion) or fanning of other toes (area

Superficial Reflexes : Abdominal Reflexes

- ✓ **Stimulus: Scratching of the abdominal skin by blunt object.**
- ✓ **Response: Contraction of the abdominal muscles as indicated by movement of the umbilicus in opposite direction to scratch *(type of withdrawal reflex)*. Intact pyramidal tract is needed for its appearance>**
- ✓ **Abnormality: it needs intact upper motor neuron to function, so it is usually lost in**



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%20%20reflex&safe=active&ved=2ahUKEwiZlJHc_KzrAhUW1IUKHWNHDygQMygae

Superficial reflexes.

1) Cremasteric reflex:

- ✓ Stimulus: Scratching the skin of the inner aspect of the thigh in males.
- ✓ Response: Contraction of the cremasteric muscle and elevation of the testis.
- ✓ Center: L1−2

2) Anal reflex :

- ✓ Stimulus: scratching the skin around the anus.
- ✓ Response: contraction of external anal sphincter.
- ✓ Centre: S3−4

3) Scratch reflex:

B) Deep (Proprioceptive) Spinal Reflexes

1. **Stretch Reflex: mentioned later.**
2. **Inverse stretch reflex: mentioned later.**

C) Visceral (Autonomic) Reflexes

3. **Micurition and defecation Reflexes: S 2-4:**
4. **Erection S 2-4**
5. **Cold pressor effect (exposure of the skin to cold leads to VC)**
6. **Peritoneal irritation leads to relaxation of GIT wall**

Lecture Quiz

➢ **Concerning the withdrawal reflexes:**

a-They are the only polysynaptic reflexes in the body.

b-They are associated with crossed extensor reflex.

c-They are supportive reflexes.

B

d-They neither show after discharge nor reciprocal innervation.

e-Their afferent neurons belong to A alpha nerve fibres

SUGGESTED TEXTBOOKS

1. Ganong review 25th edition chapter 9 from page 206 to 212
2. Ghyton and Hall 13th edidition from page 696 to 701


THANK
YOU